

Professor Bennett with compliments for
10 A.R.

RELAPSING FEVER IN EDINBURGH

DURING THE FIRST FIVE MONTHS
OF THE YEAR 1870.

BY

CLAUD MUIRHEAD, M.D., F.R.C.P.E.,
ASSISTANT-PHYSICIAN TO THE ROYAL INFIRMARY.

READ BEFORE THE EDINBURGH MEDICO-CHIRURGICAL SOCIETY,
1ST JUNE 1870.

EDINBURGH:
PRINTED BY OLIVER AND BOYD, TWEEDDALE COURT.

MDCCCLXX.

REPRINTED FROM THE EDINBURGH MEDICAL JOURNAL FOR JULY 1870.

RELAPSING FEVER IN EDINBURGH, 1870.

THE announcement which was made some time ago, that relapsing fever had again made its appearance in England, could not fail to excite a peculiar interest in the minds of the medical profession in Edinburgh. For, apart from the fact that it was hardly possible that this interesting disease could come so near to us without actually revisiting the field where several years since it found so congenial a soil, it ought not to be forgotten that here, in this city, and before this very Society, relapsing fever was first accurately distinguished from typhus. To Dr Henderson belongs the merit of pointing out the essentially different characteristics of these two fevers, indubitably so in their course and symptoms, and most probably having for their origin a distinct and different poison. It was, therefore, not without much interest, and some satisfaction, that I made the acquaintance of this remarkable disease in the Fever Wards of the Infirmary, in January of this year. At the same time, it is matter of no small congratulation to the philanthropic inhabitants of Edinburgh, and reflects considerable credit on the wealthier portion of the community, that by their efforts they have been able, if not entirely to avert, at least to control within manageable limits, this disease, which is believed to make its appearance only in an epidemic form, and in periods of commercial distress, and to acknowledge for its origin, want and overcrowding.

A few notes regarding those cases which have already made their appearance, I purpose now to give you. And, first, as to their

I. Origin.

The first cases which presented themselves at the Infirmary were boys, who came from the Industrial Brigade. But these boys, I have since been able quite conclusively to satisfy myself, caught this disease by infection. The three who first came into hospital took it into their heads—prompted, no doubt, by morbid curiosity—to abscond from the Brigade Home, and to spend three or four nights at the house of the father of one of the boys in Kitchen's Court, Cowgate. This man had died somewhat sud-

denly and unexpectedly of some complaint, reported by the neighbours to be fever, but which the doctor, who visited him from the Cowgate Dispensary, informed me that he could not pronounce to be fever, because the man was then anything but feverish, and appeared to him to stand in need of food more than of physic. To the doctor's surprise, this man died about three days after he had seen him. I may mention that the man was over fifty years of age, and of very intemperate habits. He was at one time a soldier, and latterly a tailor by trade, and lived almost entirely on spirits and tobacco. Curiously enough, a son of this man was sent into the fever house in December, labouring under what was supposed to be fever. On referring to the journal, I find that he is there entered as a case of "poverty and want." He had no fever while in hospital, and had none when he came in, and, after a residence of a week or ten days, was dismissed. The only thing remarkable about him was the intolerable amount of dirt and filth with which his body was encrusted. Now, dirt is not an uncommon accompaniment to those who come into hospital with fever, but this boy far exceeded the usual amount. He himself stated that he had not been washed for three years, when his mother died of typhus fever in hospital. At that same time, both this boy and the father were sufferers from typhus. So that I am much inclined to conclude that the father did not die of typhus—indeed, I have the doctor's assurance of this—but that he died by syncope after relapsing fever. He was found sitting on the end of the bed leaning over the fireplace, as if he had got up during the night, either to warm himself, or to console himself with a smoke. As going still further to strengthen this supposition, I may mention that a neighbour of this man, who kindly went to the assistance of the old man, helping him to bed, and otherwise occasionally nursing him, himself took relapsing fever immediately after the death of this man, and came into hospital with it. Two of his children also took it, and were sent into the Children's Hospital. However, be that as it may, these three Brigade boys spent some nights in that house after the man was dead, one of the three being a son of the man. With much-to-be-commended filial respect, this boy Kennedy, with the assistance of one of the other lads, dressed his father's body decently in a shirt, and laid him in his coffin. This duty they had a second time to perform, in consequence of the cupidity of the sister of this unfortunate man, who, coming into the house, observed what she considered unnecessary waste in sending a shirt to be buried. This she would not allow, but removed the shirt, and carried it to the pawn-shop. And this same sisterly conduct she exhibited a second time, when the boys had again wrapped the man in a sheet. The woman, I understand, is since dead, possibly of the same fever. I have since ascertained that the amount of cubic space allowed to each inmate of this room during the time that the boys resided there, was only 260 cubic feet.

I enter into these particulars because they have a material and intimate bearing upon this case, showing the amount of contagion as well as infection to which these lads were exposed, and because a good deal was made of this story, which had got about in a misrepresented form, to prove the intimate connexion between typhus and relapsing fever, if not their identity; the belief being that this man had died of typhus fever, which he certainly did not do, whatever was the cause of his death.

Next day these three lads returned to the Brigade Home in Grove Street. Two of them were sent to the cells for running away and leaving their work, and fed on bread and water. The third boy was not punished, as he seemed to have a reasonable excuse for leaving work in the death of his father. In the punishment-cell, one boy (Connor) was kept for two days and nights, after which he returned to his work, and was treated like the other inmates. The second boy (Hughes), after being kept one day and night in the cell, was next morning dismissed from the Brigade as incorrigible. The third lad (Kennedy) continued to board and lodge at the Brigade Home until the 12th of January, when he went to reside with his aunt in the Pleasance. That very night, for the first time, he complained of a sore head, while next day this headache continued, added to which he was shivering all day, though still going about; but this he could not do next day, and in the afternoon he was obliged to go to bed, and on Saturday, the 15th, he came into the hospital, on the fourth day of his illness.

On the afternoon of the 14th January, the first boy (Connor) began to shiver while at work, and in the evening complained of intense headache, was giddy, could not walk straight, and became delirious. Next day he was sent into hospital, on the second day of his illness.

The second boy (Hughes), after dismissal from the Brigade, earned his livelihood, such as it was, at the railway station, the usual haunt of this class of boys, by carrying portmanteaus and such like, sleeping at night in common stairs, lodgings when he could pay for them, and canal boats. On the 13th January, he began to complain of headache and shivering; and as if by instinct, he went up to the neighbourhood of his old quarters, in Grove Street, where he was kindly treated by a baker who took compassion on him, and allowed him to stay all night in his flour-house, and covered him over with many flour-bags to keep him warm, and left him there for the night. During that night he vomited freely. Next day he assisted the men at their work, so far as he was able, and that night he again spent in the flour-house. Next morning, 15th January, being still very unwell, the baker went to the Brigade Home, and entreated for him, when he was allowed to return to it. All this time, the shivering, headache, and inability to eat continued. On Sunday, 16th January, he was seen by a doctor, who pronounced him to be labouring under fever, and he was

therefore separated from the other boys; and next day, 17th January, came into hospital, on the fifth day of his illness.

Thus, then, granting that these boys took this fever, by contagion and infection, from residence in the house in Kitchen's Court, we find that the length of time during which it remained latent, or, technically speaking, the period of incubation, extended from six to nine days at least.

These boys, as I have already stated, returned to the Brigade Home after their residence in Kitchen's Court, one only of whom, however, continued to sleep in the dormitory, where there were 40 beds, until he first showed symptoms of illness. There he remained until he was removed to hospital, consequently he must have communicated the infection to his nearest bedfellows. Accordingly, the next boys in whom this fever showed itself were the boys who occupied the beds on each side of him, though, curiously enough, one intermediate boy was missed over, which suggests the possibility that contagion has more to do with the spreading of this fever than infection. However, what I wish to show at this moment is the period of incubation of the fever in these two boys. One was brought into hospital on the second day of his attack, the other on the very first day, on the 19th and 20th January respectively. Hence, dating the period of infection from the day on which the boy Connor first showed symptoms of relapsing fever—viz., on the 14th of January—the least possible period of incubation in these two lads was five and seven days respectively.

Hence, I think that I am fairly entitled to conclude that the period of incubation extends from five to ten days.

The manner by which relapsing fever spreads is for the most part contagion, though of course I do not mean to exclude the probability of infection acting also as an exciting cause. Thus, after the boy above referred to (Connor) was removed to the Infirmary, having been already two days ill in the Brigade Home, other eight boys came into hospital from the same institution, all labouring under relapsing fever, besides five or six others who were sent in on suspicion of having it. Now it is very interesting to observe, that all those boys who came into hospital, for the most part, occupied beds in their dormitory immediately adjoining each other. And though this would point more to infection than contagion as the exciting cause, it must be mentioned that these boys are all mingled together in one schoolroom every night for two hours, besides having their meals together. And every one knows how boys of this age, from 10 to 16, push and knock each other about, and how very intimate their relations are to each other. In further corroboration of this view, I may mention that other two lads came into hospital suffering from relapsing fever, who occupied the same lodgings in the Grassmarket, and who also shared the same bed. Another family of six were admitted from Canonmills, and the father told me that he took the fever from his little son, who was crying bitterly with

the pain in his head, and entreated his father to take him into his bed, as he thought he should then be well; the father complied, and that very morning he was seized with headache and shivering. On the whole, then, contagion is quite as potent an exciting cause, if not more so, than infection.

As to *Sex*.—Of the 40 cases which have come under observation, 32 were males, and only 8 females, or exactly 4 to 1.

As to *Age*.—24 of the 40 cases were under 20 years, or 60 per cent. The oldest was 59, and he died; the youngest 5 years of age.

Occupation seems in no way to predispose persons to be attacked by relapsing fever. For those who came into hospital suffering from it were representatives of all kinds of trades, and no one more than another seemed to furnish victims to this disease.

It is worthy of note, that of the actual number of patients observed, 64 per cent. were either actually born in Ireland, or, though born in this country, were of Irish extraction, and lived in all the habits and ways of their Irish parents. And if we add those who undoubtedly took the disease directly from these Irish people, either from lodging with them, and thus virtually becoming as one of them, or by waiting on them when sick, we raise the percentage of Irish who were attacked to 77. Two were Englishmen, tramps, who came to Edinburgh with the disease upon them, so far as I have been able to gather, and they left the city as soon as they were thoroughly convalescent. They resided for a day or two, before entering into hospital, in lodgings in the Grassmarket, where they communicated the disease to others living in the house. The remainder were Scotch people.

But of all the causes which have been held to excite this disease, destitution occupies by far the most prominent position, and hence, indeed, many of the synonymes by which it is known, as *Famine fever*, *Armentyphus*, *die Hungerpest*. Without at all attempting or desiring to deny that this is a very common and the usually accepted cause of relapsing fever, I wish to state that in no single instance which came under my observation could starvation be said to be the immediate cause of the disease. Not one of those individuals could be said to be emaciated. In fact, they were all wonderfully clothed with fat. As a rule, they were stouter and more well-to-do in appearance than typhus fever patients usually are. But not only did they appear to be well nourished, but, on strict and repeated inquiry, not one of them would confess to having been in destitute circumstances. On the contrary, many of them lived well, and were in the habit of eating butcher-meat every day, some only two or three times weekly, and in no case, where I made the inquiry, did I find that they did not partake of it at least once a week. I take this article of diet as a pretty fair test of the style of living in that class of people who become inmates of the Infirmary, for this they are wont to regard as a sort of luxury, and usually it is the first thing to be dispensed with when their circum-

stances cease to be quite so prosperous as usual. And, further, not one of those individuals was out of work at the time of entering into hospital, with the exception of the two Englishmen, who arrived from Manchester in search of work, having found their way to Edinburgh after a long journey of some weeks on foot. It is quite possible that they had not lived so well as they had been accustomed to do during their pedestrian tour; at the same time, it must be remembered that they were neither destitute nor entirely without funds, as they immediately located themselves in respectable lodgings in the Grassmarket, not altogether unknown to people of their class, and which rejoices in the name of the "Stranger's Home." But, excluding these two men, who in all likelihood arrived here with the disease upon them, I found that most of the patients were in receipt of good wages, ranging from 16s. a week up to 30s. and 35s. In this, of course, I do not include the apprentice boys, who, in addition to their wages, had the advantage of free board and lodging. I shall revert to their case again. And in addition to this, in several instances, more than one member of the family was earning weekly wages, which rendered the keeping up of the household all the lighter for the father, and by this means enabled the family, as a whole, to fare better.

Then as regards the Brigade boys. At first, believing entirely in the assertion that destitution has more to do with the generation of this fever than anything else, I was disposed to blame the managers of that institution for trying to overtake more than their income allowed them to do, with justice to the recipients of the charity. But, on inquiry, I find that this was not so; on the contrary, the boys were well and abundantly fed, with one slight error; and this was certainly a grave one, but which has, I understand, been now rectified.¹ The fault I refer to was this, that certain of the boys who, as apprentice painters, etc., happened to be engaged at work in parts of the town too distant from the Brigade Home in Grove Street to be able to return to it for dinner, during the dinner-hour, were not provided with sufficient food to make up for the want of the otherwise plentiful meal. They merely took in their pocket a slice and half of bread, with, at times, the addition of a little cheese; and, after this, they got nothing from breakfast time till they returned home in the evening. Without doubt, this was much too scanty a supply of food for growing lads, aged about 15 or 16, especially when they were working hard all that time. Yet, notwithstanding this acknowledged limited supply of food, the lads were by no means in what would be called an

¹ *Dietary of Industrial Brigade.*—Breakfast: Porridge and milk *ad libitum*, and slice of bread. Dinner: Two plates of vegetable broth with beef in it, and a slice of bread; or, herrings, potatoes, and bread; or, rice and bread, in addition to broth, on Friday. Supper: Porridge and milk, and a slice of bread after going to bed.

impoverished or destitute condition. On the contrary, they presented the appearance of lads in good condition, of lads who had been "training" for some time, without any superfluous fat, firm muscle, and a generally healthy aspect. Further, if this small allowance of food had anything to do with the generation of this complaint, how comes it that it did not spread to the other lads who were in precisely the same circumstances, and who presented precisely the same conditions for its development as those in whom it showed itself? for there were many other lads who did not return to the Brigade Home at dinner-time, and who carried with them in lieu thereof the same portion of bread and cheese, and yet they did not take the fever. Then, again, on the other hand, lads who enjoyed the benefit of a good dinner daily took the fever notwithstanding. This, it appears to me, is of itself sufficient evidence that starvation had nothing whatever to do with the generation of the fever in their case.

No doubt, I shall be asked, if I thus deny that destitution acts as an exciting cause of relapsing fever, what do I consider the exciting cause to be? Now, I desire to state emphatically that I do not deny that starvation *may* prove an exciting cause, but all that I am arguing against is, that it is the *only* exciting cause, or even the chief exciting cause. For, as I have already stated, not one of the cases of relapsing fever which have been admitted into the Infirmary this winter, presented the usual symptoms of starvation. The only other exciting cause which appears to me to apply with equal force to all, or certainly the great majority of the cases, is overcrowding in their homes. Thus, for instance, in the dormitory at the Brigade Home, 40 boys sleep together; though it must be admitted that, even in the middle of the night, about 2 A.M., four or five hours after they have all gone to bed, the air of the room is not what one would call "stuffy," but wonderfully fresh. In this room the amount of cubic space allowed to each inmate is only 360 cubic feet per head, and in the other room only 240. Yet I ought to mention, that in both cases windows are kept open all night in an adjoining apartment; though I hold that the movement of air in a room, however rapid, can never make up entirely for deficiency of cubic space. At the same time, I do not believe that the fever broke out among them spontaneously, or was generated by overcrowding, though I maintain that it was propagated by this means. And had it not been for the prompt and energetic conduct of one of the most interested of the managers, who had the boys transferred to the Infirmary immediately that they showed any signs of illness, after he was told that it was fever which had broken out among them, and the further expedient of removing the still healthy boys to other quarters quite removed from the Brigade Home, by this means "stamping out" the fever, I do believe that it would have spread, and that, too, most rapidly, among the other lads, till they should all have been laid down with

it. In another instance, six of a family came in one after the other until the last of them was admitted. After repeated and careful inquiries put to the father, who was a very intelligent man, I could trace no history of infection, nor of destitution; in fact, the very reverse of this, for the man was in the habit of eating butcher-meat to dinner almost daily (Fridays excepted). He had only come from Ireland about three months previously with his family, where he had been, for him, in easy circumstances. Though, on first arrival here, he and his family caught the itch in dirty lodgings, yet he and his son immediately got work in his own trade of whip-cord maker, so that at no time were they in want of food; and, at his trade, his son was working, when he first applied to me at the New Town Dispensary. He could tell me of no one of the many workers having been laid aside from illness of any sort since he joined them, neither had he heard of any of his neighbours suffering from any similar complaint. The only cause, then, which I have to fall back upon is this overcrowding. On visiting his house, I found it consisted of one small room, 15 ft. \times 12 \times 8, with a small dark closet, which was used as a lumber-room. There was one window of very limited dimensions. The amount of cubic space allowed to each inhabitant in this room was thus only 240 cubic feet, and the movement of air was certainly of the smallest possible amount compatible with movement at all. The air in the room was hot, stifling, and smelt sickeningly of human beings.

Then, from a house in the Cowgate, consisting of one room in the upper flat, where nine people lived, seven of them came into the Infirmary, and the other two took the fever also, but remained at home. The amount of cubic space allowed to each inmate in this instance was 400 cubic feet, and the movement of air during the night is reduced to a minimum, and is in effect *nil* when the fire goes out. Were it not for the presence of this generator of current-distribution, I do believe that this room would speedily have degenerated into a veritable pest-house. As it was, during the day, when the fire was alight and the windows open, it was an immense satisfaction, and with a feeling of intense relief, that one escaped from it into the free air. In this house, I was told that the first to take the fever was a girl of 16, who was a worker in a tobacconist's shop, and she asserted that she caught the fever there, simply because on coming home one night she was seized with intense headache and vomiting; *therefore*, she had caught the infection in the shop. She knew of no other one who was ill at that time among the workers, nor of any that had lately been so. These people fared well, and seemed to be wonderfully happy in their miserable house, and very contented. The room was very dirty—so were the inhabitants of it; and on entering it one was nearly overcome with that overpowering odour which emanates from the unwashed bodies of the human species. Certainly, if the fever did not arise from this state of matters, it was small wonder that all the inmates took it after it

made its appearance among them. From that house it spread to the two lower floors, evidently by contagion, as the families were very intimate, indeed, related to each other, until fifteen in all took this fever in this one house.

Hence I feel warranted in concluding, that overcrowding has quite as much to do with the generation of relapsing fever as destitution, infinitely more in its propagation, and in the cases which have this year presented themselves at the Infirmary, much more to do with it as an exciting cause than destitution.

I proceed now to give a summary of the more important *symptoms* of relapsing fever.

II. *Symptoms.*

As I have already stated, I believe that the period of incubation extends from five to ten days, after which, without any premonitory symptoms whatever, the patient is suddenly seized with intense headache or chilliness, often amounting to decided rigors, or vomiting. Some one or all of these usually attacks the patient when he considers himself to be in the enjoyment of perfect health, and he is quite unable to account for the sudden feeling of general *malaise* which speedily supervenes upon the first onset of the complaint. Thus, in the case of one lad, who was at his work all day, and went through it with his usual activity, he, on his way home in the afternoon, felt chilly, but was able to enjoy his supper of porridge and milk. Immediately thereafter, severe headache attacked him, he became giddy, unable to walk, had repeated rigors, became unconscious and delirious to such an extent as to need restraint to keep him in bed. This, however, was an exceptionally severe case. It is rare for the disease to lay hold of the brain to such an extent, particularly at the very outset of the fever. More usually this chilliness is of short duration, and is for the most part a mere subjective symptom, and is speedily succeeded by a sensation of heat, which at times attains such an intensity as to register by the thermometer a temperature of 106° or even 107° Fah. During this stage the patient most usually is extremely restless, though sometimes he is, as it were, so felled by the poison as to lie utterly prostrate and apparently unconscious, totally helpless, and passing his evacuations in bed unknowingly. He complains of great thirst, and the tongue, while in the majority of instances moist, is covered more or less with a whitish yellow fur. Vomiting of green bilious-looking matter and nausea is frequent at this stage. After a period of from five to seven days, this state of matters as suddenly ceases as it began, most usually by crisis. The temperature falls to the normal point, more often below it, the pulse sinks in the number of its beats correspondingly, the headache ceases, the intense thirst disappears, appetite returns, a profuse sweat literally bathes the patient, and naturally the urine now becomes scanty, while slight diarrhoea at times sets in. And, again, when the patient believes himself per-

fectly well, and laughs to scorn his doctor's prediction that he will have another attack, about the twelfth day, more frequently on the fourteenth, dating from the first day of his illness, he has another slight chilly feeling, it may be sickness and vomiting, then the increase of heat, which may even surpass the degree attained in the former paroxysm, the same acceleration of the pulse, increase of urine, and thirst, and again ending in three or four days by a sweat even more profuse than on the first occasion, and this time almost invariably accompanied by an abundant crop of sudamina all over the body, but more particularly over the abdomen. Another week of apyrexia succeeds, and rarely another paroxysm sets in, lasting this time only, it may be, for one or two days, or even half a day. When the first attack is protracted beyond the week to ten or twelve days, the apyretic stage usually is ushered in by a lysis, and the temperature does not sink more than one or two degrees below 98°, and frequently these cases have no relapse. Of course it may fairly enough be objected that this is not a case of relapsing fever at all, but a case of simple continued fever, or of synocha, though other symptoms may indicate its closer alliance to relapsing than to any other form of fever. Anticipating this objection, I have not included among the cases of relapsing fever those which did not present a distinct relapse, but have styled them cases of simple continued fever.

Going a little more into details, I remark concerning—

1. *Integumentary System*, that as a whole, in the majority of cases, it presents a slightly yellowish tint or “bronzed” appearance, as Dr Cormack described it. At times it is actually yellow, jaundiced, and that too very deeply, and the conjunctivæ are distinctly tinged yellow. Towards the end of the first paroxysm the face becomes very red, and even purple. To the touch the skin feels pungently hot. As to any

a. *Eruption*, I have failed to meet with it in any case of undoubted relapsing fever, though carefully watching for it. In one instance—which, however, I have not reckoned among those of relapsing fever, because the man left before any relapse took place, but which, at the same time, from the symptoms presented, I regarded as a case of protracted relapsing fever, lasting nine or ten days,—in this instance there certainly was an eruption of rose-coloured spots over the abdomen and back, rather larger in size than those usually observed in typhoid fever, but precisely of the same rosy hue, slightly elevated, which disappeared on pressure, and which, from their position and appearance, I regarded as the result of congestion of the capillaries of the papillæ. Since writing this, I have met with an undoubted case of relapsing fever, where there appeared on the fourth day of the fever a profusely copious rash over the whole body, even on the soles of the feet. In character it presented the appearance of measles rather than of typhus. It was of a rosy hue, distinctly papular, elevated considerably above

the skin, and the colour faded on pressure. It lasted three days, and was visible for one day after defervescence. In the relapse, no spots were to be seen; but on the day of crisis, a few red papules of small size were noticed on the wrists and back of the forearms, which quickly disappeared. Next day a few stigmata, not unlike the isolated congested follicles observed in scarlatina before the rash becomes diffused, were seen on the chest and abdomen. These, also, only lasted one day. In neither case was there any desquamation nor any pigmentation.

But in very many cases I have observed a very marked prominence and erection of the hair-follicles, especially over the abdomen and thighs, during the paroxysm. This is not only visible to the eye, but on passing the hand over the skin a peculiar sensation of roughness is perceived, in some cases so striking as to suggest the impression conveyed when passing the fingers over fine emery paper. This arises, no doubt, from the hyperæmic condition of the cutis vera, or more probably from the action of the poison of the fever upon the nervous twigs which supply the individual papillæ; very possibly the combination of these two causes produces this appearance. For although the skin does not present a uniform redness, such as one might expect were the papillary network of capillaries in a state of active congestion, yet this very appearance of congestion is observed on the face, particularly to the end of the first paroxysm, when it sometimes even becomes livid. And further, that the follicular network of capillaries, as distinct from the horizontal network beneath the cutis, is at least partially congested, is evident from the fact that minute papules are here and there met with over the abdomen, the result of swelling of the hair-sacs and sebaceous glands, precisely similar to what one observes in scarlatina papulosa. These undergo still further development, become vesicular on their summit, are filled with a transparent or slightly opalescent fluid, which may ultimately become of a more yellow or even puriform character. These of course are few and scattered, and are by no means uniformly met with. All this time, during the first paroxysm, no moisture is to be seen on the skin; but as soon as the crisis sets in, this abnormal state of the glandular apparatus ceases, the obstruction of the efferent ducts of the sudoriferous glands, whatever it may precisely have been, is removed, and the sweat which has been for so many days arrested pours out over the whole body, to the great relief of the patient. Coincident with this profuse sweating, great prostration usually sets in, but I do not believe that the two stand in any way related to each other as cause and effect, as one might be at first disposed to imagine. With the second paroxysm, this same state of congestion and suppression of the sweat again appears, and with the crisis the sudoriferous ducts again become patent, and pour forth the sweat in still greater abundance than formerly, and are in fact incapable of transmitting all the fluid which is so abundantly secreted by the whole

network of capillaries in and beneath the skin, so that it emerges around the sweat-ducts, collects beneath the epidermis, lifts it up, and appears in the form of small clear vesicles or sudamina. This was an almost constant accompaniment of the second crisis, seldom or never with the first.

Herpes of the face, ears, and neck occurred in four or five cases after the paroxysm was over, and during the remission. It did not last long, speedily dried up, and left black crusts, which persisted for a week or ten days.

In one case, after the first paroxysm, complete desquamation of a furfuraceous character took place over the whole body, but most markedly around the neck and over the upper portion of the thorax.

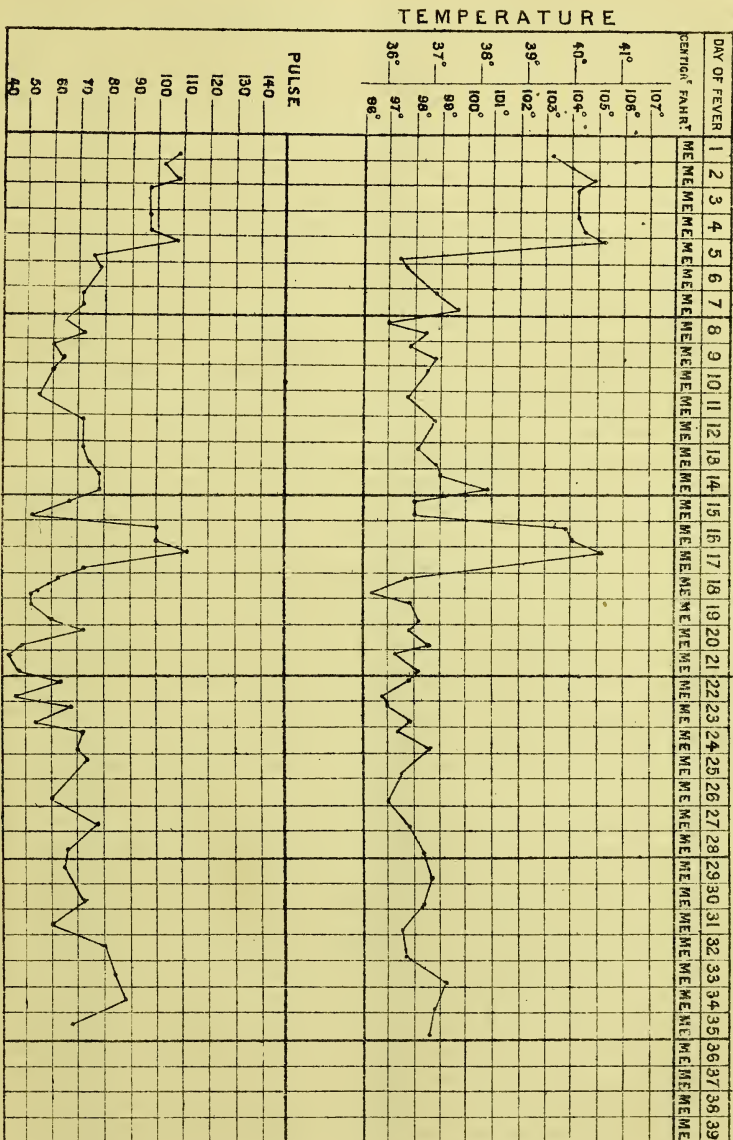
b. *Odour of the Skin*.—In many cases, if not in all of them, the skin emits a distinct and characteristic odour. This unfortunately is not easy of description. I cannot say that it reminded me of burning straw; but in the individual who offered an example of it in its most intense form, it suggested the smell peculiar to mice in a concentrated degree, approaching more nearly to that evolved from a menagerie where monkeys predominate.

c. *Temperature of the Skin*.—This is very remarkable, and most characteristic, I might almost say pathognomonic, of this form of fever. Within an hour or two after the first sudden onset of the attack, even while the patient still complains of the subjective symptom of chilliness, the temperature, as registered by the thermometer in the axilla, shows an increase of from four to six degrees Fah. above the normal temperature. I had the opportunity of seeing three patients on the first day of their attack within a few hours after they began to complain of headache, and their temperatures when registered were respectively 102.2° , 103.2° , and 104.2° Fah.

During the first Paroxysm, it ranges from 102° , the lowest point observed, to 106.2° , the highest point noted. The evening temperature is usually higher than that of the morning, by from one to one and a half degrees. On the third day of illness, however, this increase in the evening temperature is not observed so persistently, but more frequently it *falls* below that of the morning, or registers the same point. On the fourth and fifth days it observes the same relation as at first; and having attained its maximum height, between 104° and 105° in the average of cases, on the fifth to the seventh day, the temperature suddenly and rapidly sinks to a point about two degrees below the normal standard, in the course of twenty-four hours, thus presenting a range of temperature of from eight to nine degrees, sometimes even ten or eleven degrees Fah. Such a remarkably sudden fall, such rapid fluctuation in one day's temperature in the human subject, is probably unique. It is unparalleled in any other disease, and may be considered diagnostic of relapsing fever.

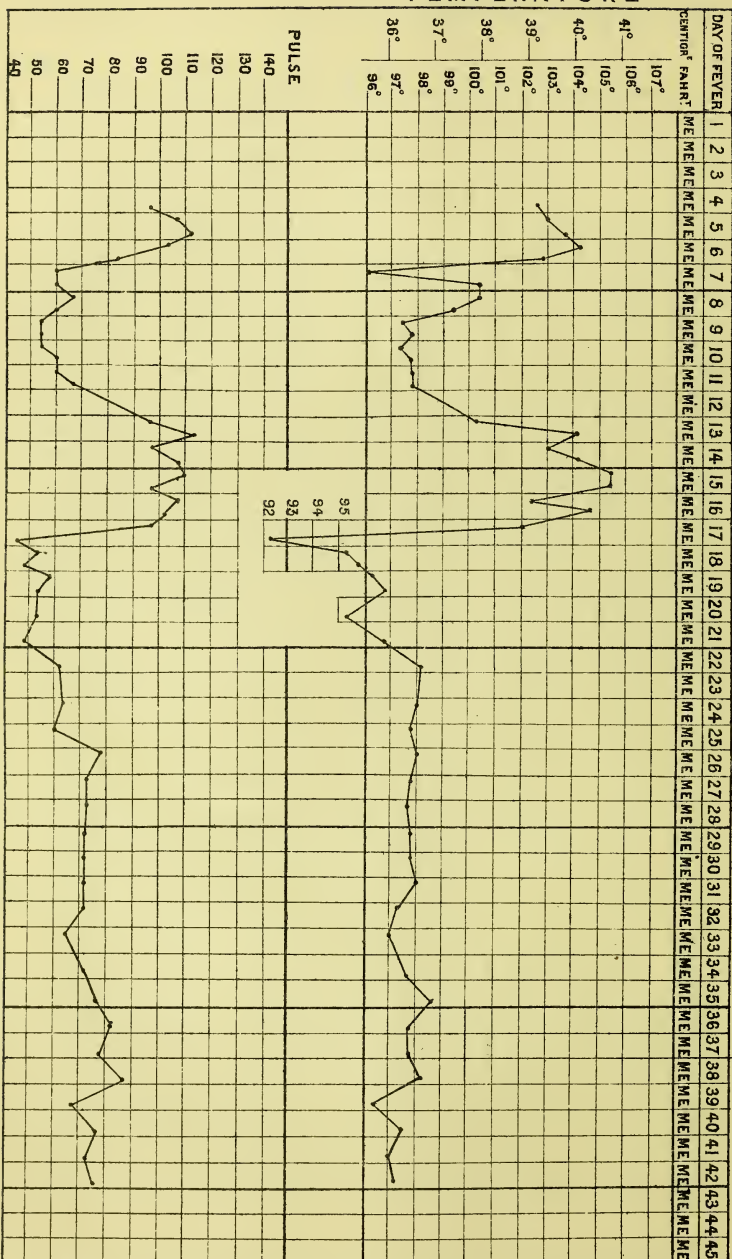
During the Apyretic Stage the temperature gradually mounts up until it reaches the standard of health, assuming it to be about 98.4° ,

TEMPERATURE & PULSE CHART OF LAD AGED 16, SUFFERING FROM RELAPSING FEVER.

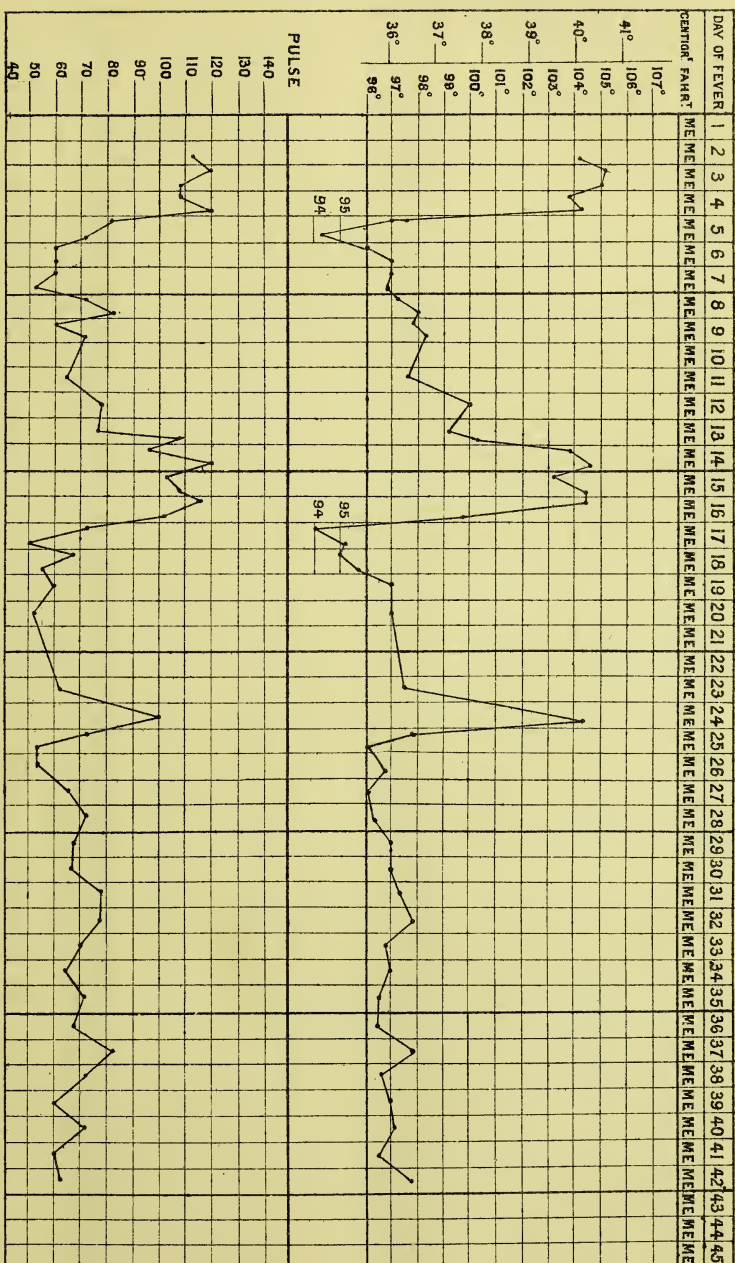


TEMPERATURE & PULSE CHART OF A LAD AGED 17, SUFFERING FROM RELAPSING FEVER.

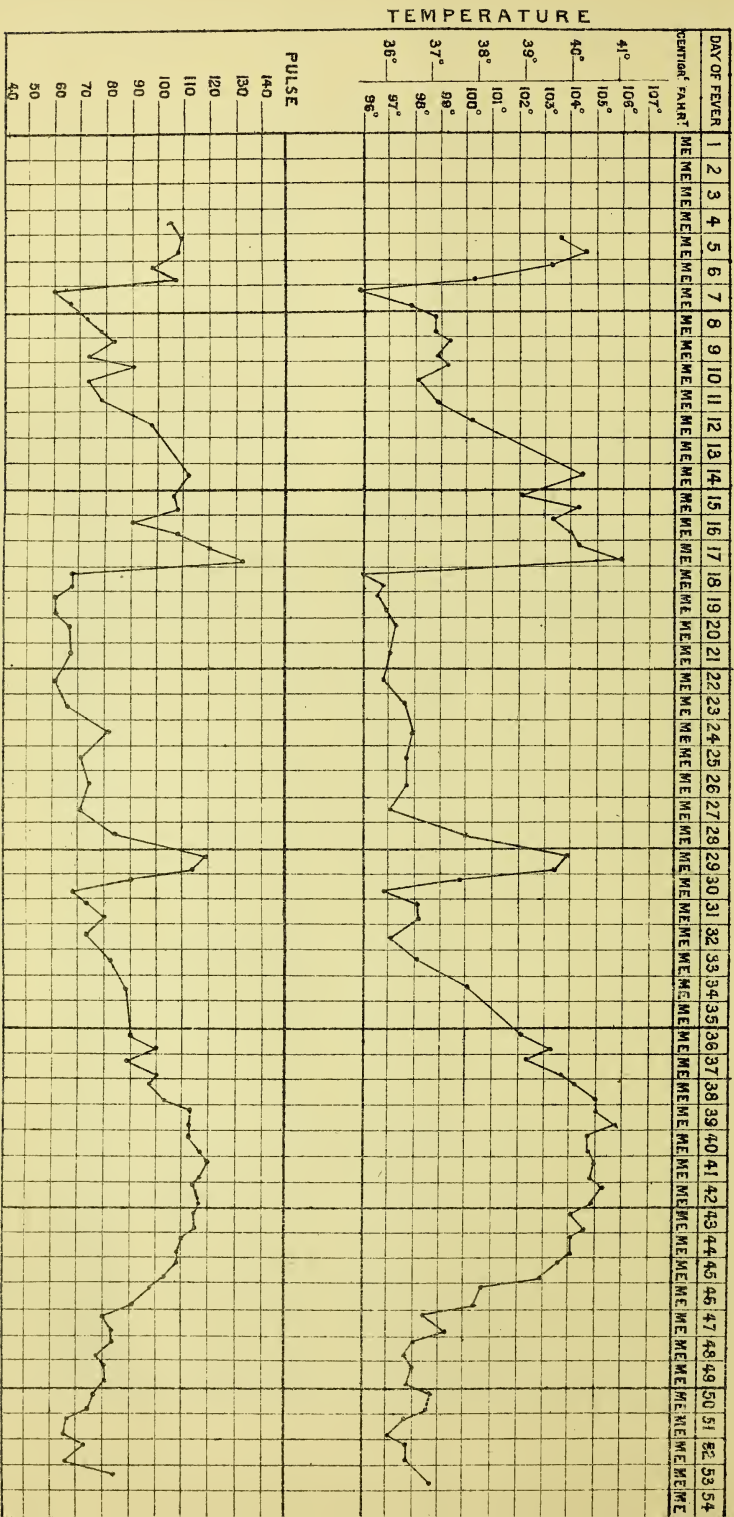
TEMPERATURE

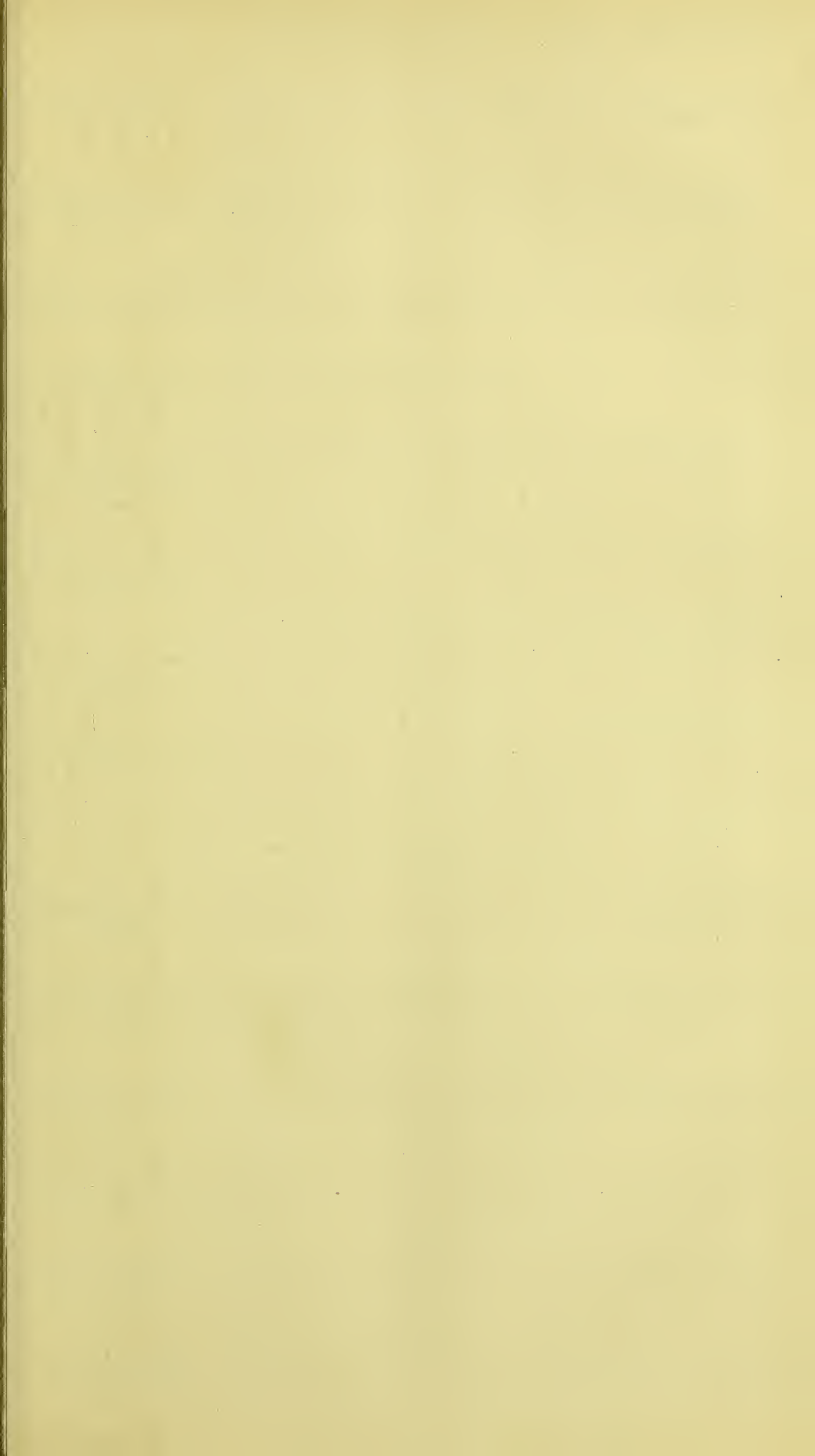


TEMPERATURE & PULSE CHART OF A LAD AGED 15, SUFFERING FROM RELAPSING FEVER.

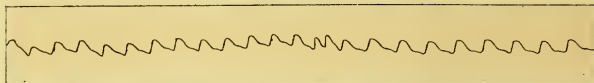


TEMPERATURE & PULSE CHART OF A LAD AGED 17, SUFFERING FROM A RELAPSING FEVER,
& AFTERWARDS OF TYPHUS FEVER, BEGINNING ON THE 34TH DAY OF ILLNESS.

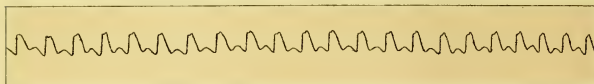




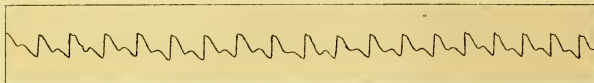
SPHYGMOGRAPHIC TRACINGS OF THE PULSE OF A GIRL AGED 17
DURING FIRST RELAPSE.



*2nd Day of 1st Relapse,
Pulse 140.*



*3rd Day of 1st Relapse,
Pulse 132.*



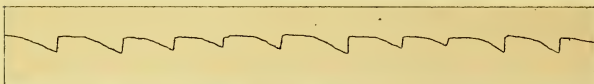
*1st Day of 2nd Apyrexia,
Pulse 96.*



*2nd Day of 2nd Apyrexia
Pulse 84.*



*1st Day of Convalescence
Pulse 80.*



*2nd Day of Convalescence
Pulse 64.*



*3rd Day of Convalescence,
Pulse 66.*

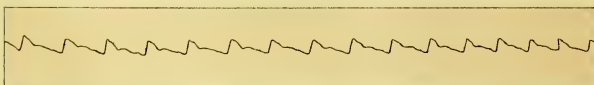


Taken during a Rigor.

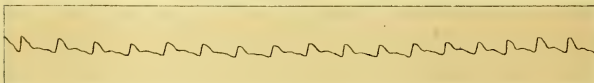
PULSE OF A MAN AGED 50, DURING FIRST RELAPSE.



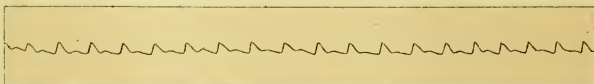
*1st Day of 1st Relapse,
Pulse 90.*



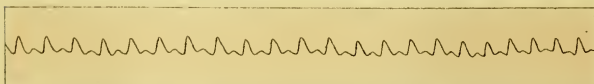
*2nd Day of 1st Relapse
Pulse 104.*



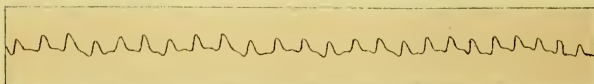
*3rd Day of 1st Relapse
Pulse 108.*



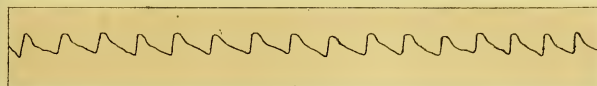
*4th Day of 1st Relapse,
Pulse 112.*



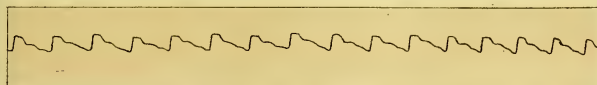
*5th Day of 1st Relapse,
Pulse 140.*



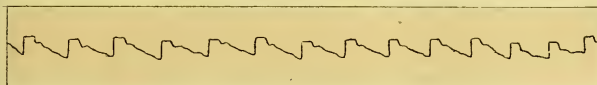
*6th Day of 1st Relapse
Pulse 120.*



*1st Day of 2nd Apyrexia,
Pulse 96.*

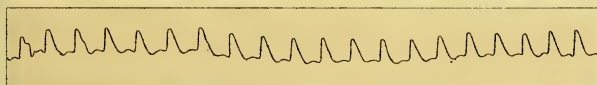


*2nd Day of 2nd Apyrexia,
Pulse 92.*

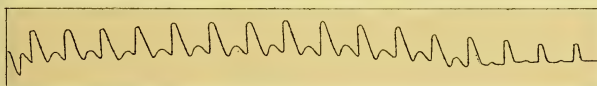


*Convalescence,
Pulse 76.*

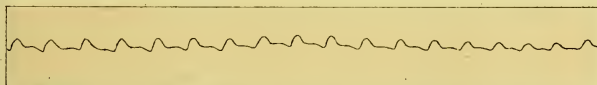
PULSE OF A LAD AGED 15, DURING FIRST RELAPSE.



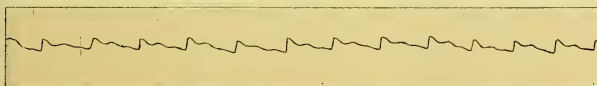
*2nd Day of 1st Relapse
Pulse 124.*



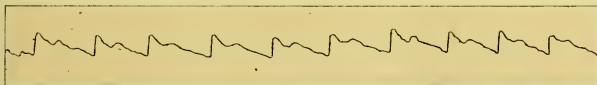
*3rd Day of 1st Relapse
Pulse 114.*



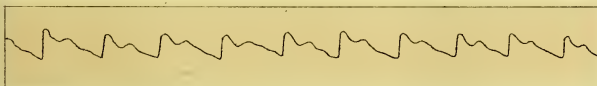
*1st Day of 2nd Apyrexia,
Pulse 102.*



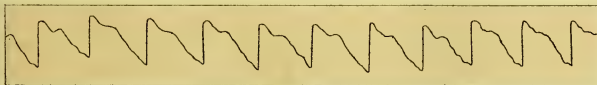
*2nd Day of 2nd Apyrexia,
Pulse 76.*



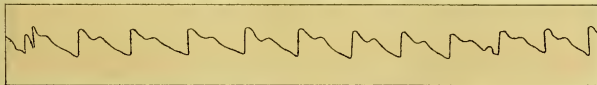
*1st Day of Convalescence,
Pulse 68.*



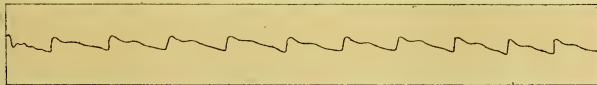
*2nd Day of Convalescence,
Pulse 62.*



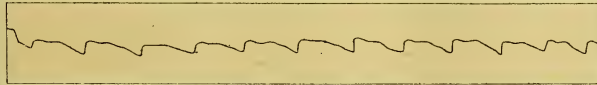
*3rd Day of Convalescence,
Pulse 66.*



*4th Day of Convalescence,
Pulse 66.*



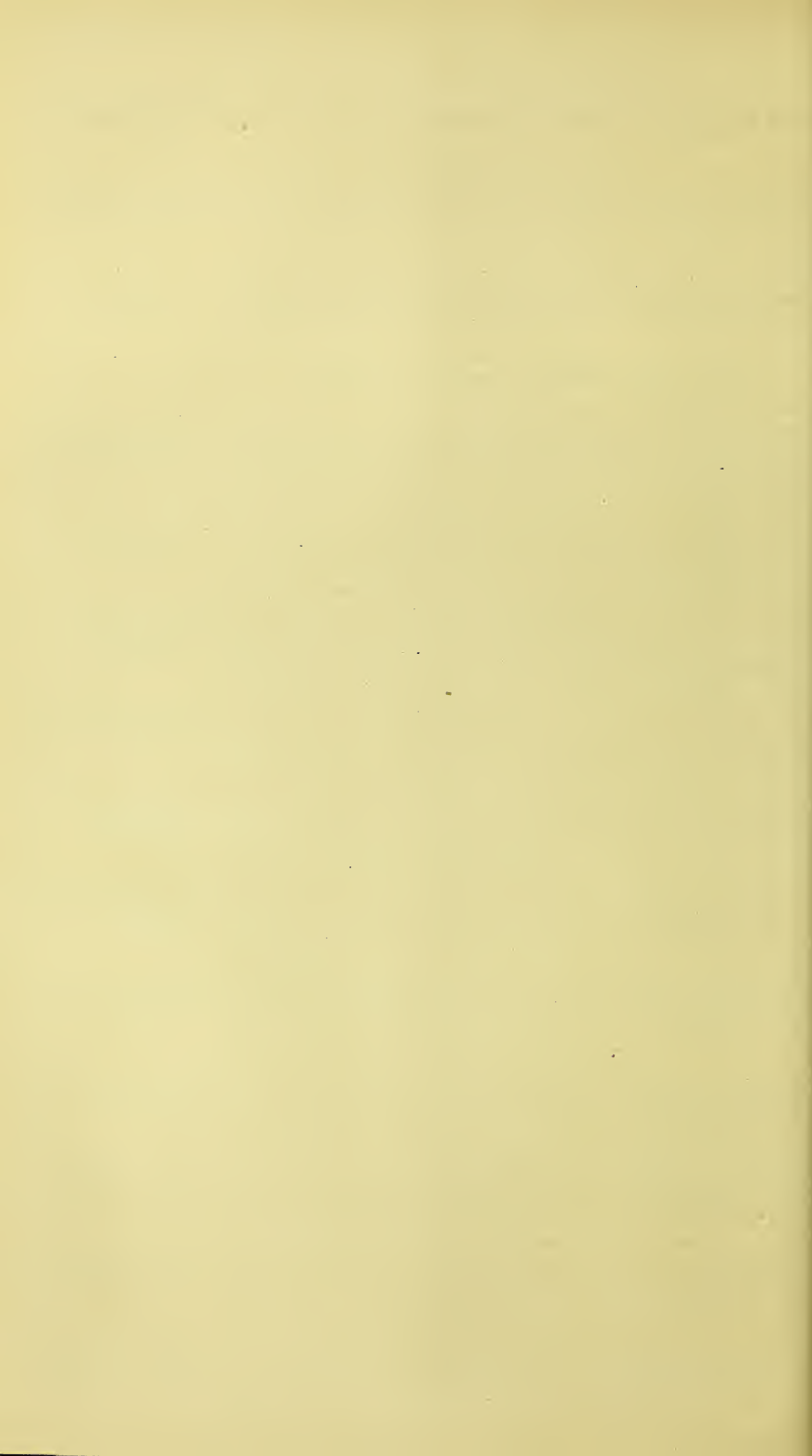
Pulse of Health.



Pulse of Health.



Pulse of Collapse.



the morning and evening preserving the same relation to each other as was observed during the first pyrexia. Some time after the remarkable fall which marks the crisis, the temperature makes as sudden a bound upwards, though by no means to the same extent, possibly to about a half of the fall on the average, as if nature resented this interference with her usual ways, and thereafter *gradually* sinks to about one degree below the normal point. This state of matters continues for about a week, when again, usually from the twelfth to the fourteenth day,—

First Relapse.—It makes another sudden bound upwards of from 3° to 6°, the evening temperature still exceeding that of the morning, while usually, though by no means invariably, the evening of the second day of this relapse exhibits a decline below that of the corresponding morning; only, however, to be made up for by a still further rise the next day, the maximum temperature of the relapse in the majority of instances exceeding that of the first paroxysm. Having attained the maximum usually in four days (the highest point noted in the relapse was 106° F.), the temperature once more sinks rapidly to a point two, three, four, even six degrees below the health-range. The lowest I ever noted in the first relapse was 92°, and in this case the temperature fell no less than 13° in twenty-four hours. The lad said, on being questioned as to his sensations, that he did not feel chilly or cold, though his body felt cool to the touch, and his breath was also cool. He was well covered with blankets, and had a glass of hot grog given him. He was bathed in perspiration.¹ Another lad, whose temperature fell 10° in one day, felt decidedly cold, shivered, and, to the touch, was chilly. Hot bottles were put round him, and hot toddy given him to drink.

Second Apyretic Stage.—The temperature again works gradually up to the normal standard, but this time more slowly, as the patient is usually more exhausted after the relapse than after the first paroxysm. In about a week after the crisis a

Second Relapse may take place, lasting from one to four days. Here the temperature makes its usual sudden spring of six degrees, and may fall again as many the very next day. In other cases it rises gradually, and does not attain anything like so high a point as on the two former occasions, usually not above 102° or 103°, and thereafter gradually sinks to between 96° and 97°. After another interval of a week a third relapse occasionally occurs, but I have only observed this in two or three instances. Unfortunately, at the

¹ This is the lowest temperature that I have ever observed, with the exception of one case of collapse, resulting from opium-poisoning, in which instance the temperature (in the vagina) was only 89° F., while in the axilla it was 92°. In the collapse of relapsing and intermittent fever, it is stated that the internal temperature is much the same as that of the external temperature. As a rule, according to Pribram, it may be stated that, when the temperature begins to rise, the internal temperature (as ascertained from the rectum or vagina) rises much more rapidly than the external, while, in the decline of the fever heat, the reverse is the case in relapsing fever.

end of the third week of the fever, a woman and a man took typhus, at the end of the fourth week a lad took typhus, and at the end of the fifth week of relapsing another lad took typhus. At first I naturally enough supposed that it was merely to be another relapse, until the presence of the eruption cleared away all doubt. For a considerable time after the last relapse the temperature keeps rather under the normal point.

2. *Circulatory System*.—a. *The Pulse* observes very much the same series of fluctuations that we have already noticed with regard to the temperature. At the outset of the attack, in each of those three cases which were seen on the very first day, it ranged from 108 to 126. The highest number of beats noted was in a child of eight years of age, where the pulse beat 148 times in the minute. And though this is to be looked for in the case of young children, still it was not uncommon to find the heart beating 120 to 130 times per minute in men and women of the age of thirty or forty. In the remission it falls as markedly as the temperature. Thus in a lad of seventeen the number of beats fell in one day from 102 to 44, or a difference of 58 beats; this was the slowest pulse observed. In another lad of seventeen the difference was 60 beats, in another 64 beats, in the twenty-four hours. With the relapse it rapidly accelerates, rising to 112 from 65 at once, though usually this is more gradual.

Its character during the paroxysms is full, sharp, thrilling, often bounding; while in the remissions it is slow, feeble, often irregular and intermittent, and markedly dichrotic.

b. *Action of Heart*.—During the remissions its action is always feeble. Generally the first sound is weakened, the second appearing proportionally intensified. At times the first sound at the apex is almost inaudible, and this may last for two or three days after the crisis. At other times a distinct blowing murmur is heard at the base with the first sound, propagated into the great vessels in the neck, most probably due to anæmia. But most frequently of all, the first sound of the heart is unusually prolonged, often to double the normal time in the remissions.

3. *Digestive System*.—a. *The Tongue* from the outset presents a coated appearance; at times merely a slight silvery gray fur, such as is observed in persons who have continued the use of arsenic for a length of time. At other times the fur is of a denser white, while the posterior two-thirds may be thickly coated with a thick yellow layer. Where the film is thin the papillæ are very prominent, and are brought boldly into relief by the general white coating. The anterior third is in general free from this fur, and offers a decided contrast to the rest of the tongue in its peculiarly red appearance, often assuming a triangular shape; the edges of the tongue also presenting a very marked red fringe. For the most part, though thickly coated, the tongue remains moist throughout the whole illness; but not unfrequently the anterior red third be-

comes dry and brown. This dry-brown appearance sometimes, though rarely, extends in a central streak nearly the whole length of the tongue. In very old people, where the prostration is great, the tongue may appear dry in its whole extent.

b. *Thirst* is constant.

c. *Vomiting* is an almost constant and one of the earliest symptoms. At first merely the contents of the stomach are ejected, and afterwards a green-coloured bilious-looking fluid, the result of constant retching. In no case was there any dark-coloured matter vomited which could even suggest the idea of blood.

d. *Nausea* sometimes existed without resulting in practical sickness.

e. *The Appetite* in all these cases was entirely lost, but returned with redoubled energy in the period of remission. In no instance did it persist unaltered during the first attack. But in the secondary paroxysm it was no uncommon thing, though remarkably striking and extraordinary, to see a lad eating a hearty breakfast and dinner with a pulse at 120, and a temperature of 103° or 104°.

f. *The Bowels* were, as a rule, confined during the first paroxysm, and with the crisis slight diarrhoea set in. The stools were natural in colour, and if altered at all were darker, as if merely tinged with bile. Where jaundice was well marked then the stools were loamy-coloured, not absolutely clayey, and emitted an offensive odour.

g. *The Liver* was by no means universally enlarged, yet in not a few cases its size was very distinctly increased, as indicated by percussion. This occurred most markedly just before the crisis of the first paroxysm. An almost constant symptom, presenting itself independently altogether of this enlargement of the liver, was tenderness on pressure over the epigastrium and in the right hypochondrium, often amounting to severe pain, as also in the right iliac region. In one lad the gall-bladder was distinctly visible as a prominent bulging, and on pressure-elicited an expression of considerable pain from him. It diminished in size, very decidedly, after an emetic had acted pretty freely.

h. *Jaundice*, in anything like an intense form, occurred merely in one case, and this took place during the first remission. The urine in this case was very dark, almost porter-coloured. In other two cases the jaundice was well marked, though less intense than in the former one. None of these three men complained more than others did of headache, neither were they particularly somnolent or delirious. The great majority of patients presented a slight reddish-yellow coloration of the skin, such as one observes in those who have been much exposed to strong sun in all weathers. The conjunctivæ were tinged yellow. These three cases of well-marked jaundice occurred in men aged about 25, 40, and 59.

i. *The Spleen* was almost always enlarged; and often when this was the case the patient himself complained of pain in the left hypochondriac region, and if not, it was most frequently elicited by

pressure over the region of the spleen. In not a few instances the edge was distinctly felt under the margin of the ribs, and more than once raised a visible bulging at this point. This enlargement took place most frequently during the first paroxysm, and, though not regaining its normal size, diminished very decidedly during the remission, increasing again with the next paroxysm, though not to the former size. In many instances this enlargement remained persistent for weeks, and the patients left hospital with an enlarged spleen. The number of white corpuscles exhibited in the field, when a drop of blood was examined microscopically, was largely in excess of what one usually finds in healthy blood. In one instance, about forty white corpuscles were counted, and in another case they were too numerous to be counted. In addition to this, the red corpuscles appeared altered in character; they did not run together in the usual method to form rouleaux, but adhered to each other in irregular masses, while between these the white corpuscles stood out in prominent relief. The serum looked as if it were increased,—at any rate, there was more fluid unoccupied by blood-corpuscles than one is accustomed to see in examples of healthy blood. This may have been due to a decrease in the absolute amount of red corpuscles. And in this fluid there were also observed granules or molecules of various sizes, which swelled up a little on the addition of acetic acid, but which did not display any distinct nucleus. This condition of the blood continued only during the pyrexia. So soon as the crisis set in, the white cells rapidly diminished, and in two days thereafter no excess was to be observed.

4. *Nervous System*.—a. *Headache* is, as a rule, present in all cases of relapsing fever, and, as in other forms of fever, is one of the earliest symptoms; and, along with this, giddiness is occasionally complained of. This same lightness in the head, though possibly arising from a different cause, is also a common occurrence during convalescence. Besides the pain already alluded to as being tolerably constant in the hypochondriac and epigastric regions, muscular pains are frequent, as also pains in the joints. These latter are not usually felt till the remission sets in. But by far the most frequent complaint was of intensely severe neuralgic pains, for the most part in the larger nerves, as the ischiatic, the brachial plexus, etc. These excruciating pains made their appearance usually the day after the remission occurred, and lasted usually two days, and often entirely abolished sleep, unless this was induced by some hypnotic or narcotic.

During the paroxysms an intense restlessness and weariness often attacks the patient, giving him no rest, as he can find no comfortable position in which to lie; while in other cases, though this is much rarer, the patient is, as it were, felled at once by the poison, and he lies perfectly prostrate, unable to help himself in any way, and passing his evacuations unconsciously below him. This I saw

carried to such an extent only twice. Others were listless, fretting, and generally uneasy, but able enough to intimate their wishes, and to call for a drink. Delirium showed itself in only four cases.

But after the crisis, most of the patients were for a day or two thoroughly exhausted, unable to raise themselves; and in some of the older men this exhaustion of the nervous system showed itself by aphonia and huskiness of voice. It was at this stage also that irregularity and intermission of the pulse began to appear, and in one case this exhaustion proved fatal in unexpected and sudden syncope.

5. *Genito-Urinary System*.—The quantity of urine passed during the first paroxysm is just about the same in amount as is voided in health. But in the second paroxysm it is greatly increased, as a rule; in some cases, particularly on the day before the crisis, the patient will pass water, 6 or 7 ounces at a time, every hour, sometimes twice in the hour. In one case only was it accurately measured, and the amount passed in twenty-four hours was 384. When the crisis fairly takes place, this desire ceases in great measure, and if collapse occurs, there is almost absolute suppression for the space of a day, more or less, the water being got rid of by the skin.

I regret that I have not been able to make any quantitative analysis of the urine in these cases, as my time was otherwise fully occupied in looking after the patients, and as in the fever wards we have not the assistance of clinical clerks to aid in the taking of cases. But I am in hopes that I may yet be able to overtake this, should any more cases present themselves at the hospital. In the meantime, I must content myself with giving you such particulars as were gathered from the usual hurried clinical examination of urine.

The Uric Acid was much increased during the paroxysms. A single drop or two of nitric acid let gently down the side of the test tube immediately gave a thick cloud. After standing some time, a precipitate fell, which on microscopical examination proved to be crystals of uric acid. Boiling the urine gave no precipitate.

The Chlorides, as in most other acute diseases, were much diminished, giving a mere trace during the paroxysms, and in the apyretic stages were largely increased, and during convalescence exceeded the usual amount in health.

Albumen was present to a small extent—about 1-8th in 4 cases—though it ought to be stated that the urine of all the 40 was not tested for it. One case was the one which ended fatally, and his kidneys presented nothing very abnormal at the sectio. In all the cases where jaundice was at all well pronounced, bile-pigment was found in the urine in large quantity; and I believe, from the appearance of the urine, that in all cases where that peculiar “bronzed” countenance appeared, bilirubin might readily have been detected by means of chloroform, which takes up very minute quantities of this colouring matter.

In the urine of convalescence and of the remissions, the indican or blue colouring matter, present in small quantity in the urine of health, was found largely increased, as it usually is where there has been much nervous excitement or disturbance.

As a rule the urine was acid, sometimes highly acid, with an average specific gravity of 1018.

In convalescence there often appeared deposits of oxalates alternating with uric acid crystals.

As to the *Complications*, the only one of much consequence which made its appearance was pleuro-pneumonia, engaging about a third of one side. But I am not at all sure that this did not exist before the lad was attacked with the fever; for it was there when he came into hospital, and he came in the very first day of his illness, and he went out with it in the same state. He returned in about a fortnight after being discharged, complaining greatly of the pain in his side. I took him in again, blistered his side, fed him well, gave him cod-liver oil, and after a residence of another three weeks in hospital, he was sent to the Convalescent House, still much in the same condition as when he first came in.

Bronchitis was not an uncommon occurrence, but it yielded readily to simple measures taken against it.

The only other complication was epistaxis. This occurred in two patients only,—in one to such a limited extent as to call for no treatment; in the other it was very severe, and occurred in a lad of 17. He had been dismissed from hospital, after a long residence there of five or six weeks, quite well. By an unfortunate chance, the day on which he was discharged happened to be a very snowy one. He, boy-like, was unable to resist the snow-fever, and, with some of his companions, began to throw snowballs pretty vigorously about, and probably amongst some passers-by. Anyway, he was caught by a policeman throwing snowballs, and for this offence was marched off to the police-office, to be brought before the magistrate on the following Monday, this being Saturday. He was duly charged, tried, and sentenced to be fined, or suffer three days' imprisonment. The latter alternative he elected. Meanwhile, during his detention in the police-office, as he told me, he received for his meals "a bap and a drink of milk three times a day." The day after he was discharged from the police-office, he came into the Infirmary. He was then shivering when I saw him, excited and hysterical, and felt intensely weak and miserable. His body was covered with petechiæ and stigmata. The hair-follicles on the legs and arms were all distinctly and individually marked out by a ring of congestion. He had a desire to eat, but could not when food was given to him. Next day he complained of his head being sore, and his nose bled freely two or three times, which, however, was always controlled by the application of cold. The petechiæ on the legs and arms had run together here and there, and formed large ecchymosed spots, some of them the size of a shilling. He con-

tinued to feel restless, uneasy, and complained of a bruised sensation all over his body. Injection of ergotine was ordered if the bleeding returned again. Next morning very severe epistaxis again came on. Cold was applied, and the anterior nares plugged with a pledget of lint soaked in perchloride of iron, and ice was given him; but bleeding still went on down the posterior nares. Subcutaneous injection of 3 grains of ergotine was given, and the bleeding immediately ceased, and there was no more return of it till next morning, and then only a few drops appeared. The ecchymosed spots diminished in size and faded greatly, and ultimately disappeared in a few days. This lad had also a pneumonia, chiefly confined to the posterior bases of both lungs.

As to *Sequelæ*, the principal were enlarged spleen and neuralgia, already referred to, conjunctivitis and ophthalmia, swelling of the glands in the groin and neck and parotid, inflammation of the ear with purulent discharge, anæmia, cedema of the legs, and a partial paralysis of the legs and arms lasting for a few days only. Iritis was met with in no case.

III. *Treatment.*

This was for the most part expectant, except where there were plain indications demanding interference. The experience of former epidemics held out little encouragement as to the possibility of checking the fever, or of preventing a relapse. Yet my colleague, Dr Fraser, and I both resolved to make another attempt with those remedies which are in repute as specifics in cases of intermittent fever; and, in addition to this, I also endeavoured to follow the indications given by nature in her apparent endeavour to get rid of the poison, whatever it might be.

Thus, the first method by which nature seemed to attempt to eliminate it was by vomiting. Accordingly, I took this hint, and gave an emetic. This certainly promoted vomiting, and gave relief to the patient, who had been ineffectually attempting to empty his stomach; but it did more—it emptied to a certain extent, though not completely, the gall-bladder, which was distended, and produced a visible prominence in the abdominal wall. But more than this it did not do; it neither cut short the fever, nor rendered the paroxysm less severe.

Another method of relief was attempted, much believed in and enthusiastically carried out by my late much-valued assistant, Dr Edwin Thompson—viz., cold packing. Now, though this certainly did give, in some cases, unquestionable relief to the patient, chiefly I think by inducing a gentle action in the otherwise dry and hot skin, and actually lowered the temperature for about one hour by about 1° Fahr. (though this was not an invariable rule), and also diminished the frequency of the pulse, still very speedily the temperature and pulse regained their former height, and the process had again to be gone through. The effect of this constant chang-

ing of packs, wet sheets, and cold douches was, as was only to be expected, greatly to fatigue the patient, and to induce, ultimately, greater prostration when the crisis came, than might otherwise reasonably have been looked for. This treatment in no way shortened the duration of the attack; but this much I must allow that it did, it relieved the subjective symptoms greatly. The patient, notwithstanding the fatigue necessarily incurred in its application, almost invariably expressed himself as feeling great comfort from it, saying that it relieved the pain in the back and head; and often the patient enjoyed a refreshing sleep of some hours after its employment. Another disadvantage of it was, that it induced still more copious sweating when the crisis arrived, possibly by having weakened the tissues of the skin still more; for in no case did I see so copiously profuse an eruption of sudamina as in one man who had been most assiduously packed and douched. In him the sudamina ran together, and formed small blebs, one of which measured $\frac{3}{4}$ ths of an inch long by $\frac{1}{4}$ th inch broad. In this case the reaction of the sweat was neutral. On the whole, then, I would not be disposed to treat a patient suffering from relapsing fever hydropathically, for these reasons.

Sleeplessness, and the intense agony caused by neuralgia, were readily overcome by the use of chloral in appropriate doses, without in any case a bad effect resulting. Once or twice it was vomited, which was due entirely to giving it in too undiluted a form. When this was remedied, it was invariably retained.

To prevent relapses we tried quinine alone, by the mouth, and subcutaneously as acetate of quinoidine; in combination with iron, and with nux vomica. Arsenic in large doses I also gave, and nux vomica combined with iron in large doses. The result was in every case the same; they did not prevent a relapse.

In one lad, to whom I gave upwards of 70 grains of quinine combined with 4 grains of extract of nux vomica, during three days previous to his expected relapse, I thought that I had actually succeeded in aborting the threatened relapse; for, true to the fourteenth day, the temperature in the evening marked an increase of 2° Fahr. above that of the preceding evening; the pulse was only raised by a few beats; but on the next morning, that of the fifteenth day, the temperature had fallen again to 98° , nearly 3° lower than that of the previous evening; which low state of thermometer was maintained all day, and marked the same at night. The pulse, too, fell 26 beats. But next day matters were entirely changed, and the temperature made a bound upwards of nearly 6° , and the pulse 48 beats. It is right to mention, however, that the large doses of quinine were stopped, and on the fifteenth day, the day on which the temperature fell below the normal point, 98° , he only took $7\frac{1}{2}$ gr., and after this no more. It therefore remains a matter of speculation whether, if those large doses had been continued, he would have escaped a relapse with nothing more than an indication of it for one day.

In another case, Dr Fraser began to give a man quinine in increasing doses on the twelfth day of his illness, the immediate effect of two doses of 5 gr. each being to reduce the temperature 2° , and the pulse about 12 beats. Next day, the thirteenth of his illness, he took 20 gr. in all, with 4 oz. of brandy and a pint of Bass' ale, the indication for which was the weakness of the first sound of the heart. The pulse and temperature remained pretty steady all day at 60 and 98° respectively. On the fourteenth day of illness he expressed himself as feeling quite well in the morning, with the exception of noises in his ears, and increased sensation of hunger; pulse and temperature remained steady at 60 and 98° . He took 40 gr. of quinine. Next morning, the fifteenth day of illness, the pulse was very soft but regular, 46 per minute; the first sound of the heart was almost inaudible; the noise in the ears was gone, but he had become deaf; and a copious rosy papular eruption had appeared over the arms and thighs, which was slightly itchy. His temperature was 98.6° . In the evening his pulse was 84, and his temperature 103.6° , thus exhibiting a rise of 38 beats and 5° respectively. He again took 40 grains. Next day his pulse and temperature both rose slightly, and the man was sick, dull, and giddy. He took no more quinine. Thus, in this case, quinine was given till cinchonism was fairly produced in all its forms, without having the slightest effect in preventing a relapse.

It was tried again in one or two other cases with like result, only the patients strongly objected to it, on account of its nauseousness.

To get over this, and believing that by so doing I might bring the system more speedily under the influence of the drug, I injected subcutaneously a solution of acetate of quinoidine, gr. xv., in the course of the day. I selected this preparation as it is one of the most readily soluble of all the cinchona salts. I injected this for the first time on the eleventh day of the man's illness. The only effect of this treatment was to make the man feel stronger, and to give him more energy. The pulse and temperature, though noted at intervals of three hours, presented no change worthy of remark. Next day, the twelfth day of disease, the pulse and temperature remained pretty much the same as on the previous day; but in the evening the pulse rose 16 beats, and the temperature a degree and a half. The pulse, however, was fuller and stronger, and was regular, without intermission: other gr. xv. were injected. On the following day, thirteenth of illness, the man expressed himself as feeling stronger, and no longer needing to hold on by furniture when having occasion to rise. He was eating well. Other gr. xv. were injected. The pulse this day, while strong and full, occasionally intermitted, and the stools presented a loamy appearance. The pulse in the morning fell a few beats, and the temperature declined 1.2° Fahr. from that of the preceding night. In the evening the pulse rose 16 beats and temperature $2\frac{1}{2}^{\circ}$ Fahr. I ceased to inject any more.

This too proved a failure ; the relapse had fairly set in, went through its course, and ended by a lysis in this instance.

The same result attended an attempt to stay this inevitable relapse in another case, by large doses of arsenic given in doses of 20m of liq. arsenicalis thrice daily for two or three days before the expected relapse.

In the meantime, then, the only treatment which is of any avail is that which is called for by the urgency of the symptoms which may present themselves, no drug having yet been lighted on which can stay the progress of this disease.

I have thought it necessary to go a little minutely into the results of treatment with quinine in this disease, because I have seen it repeatedly stated that, by the administration of it, the relapse was prevented. And as this statement has emanated from so trustworthy a quarter as St Bartholomew's Hospital, it demands some attention. It was stated¹ that in that hospital "three cases of relapsing fever admitted into hospital had been treated with large doses of quinine immediately before the anticipated relapse. Two cases received each 10 gr. in the afternoon of the thirteenth and morning of the fourteenth day of the fever, and 5 grains for four succeeding mornings. The third case had one 10-grain dose on the thirteenth day, followed by four 5-grain doses. The results were most satisfactory, as in none of the patients thus treated did the relapse occur. As yet there has been no opportunity of treating others in the same way. No other patients have been treated with quinine." Now, this is probably a unique result ; and it would be extremely satisfactory to learn if, after the lapse of three or four months, any opportunity has presented itself of "treating others in the same way, and if any other patients have been treated with quinine ;" but most interesting of all will it be to hear the result. I do not mean for one moment to call in question the accuracy either of the diagnosis or of the report of the cases given. I believe that they were true cases of relapsing fever, but that in all probability, in each of the three cases, this was already the relapse for which the patients applied for treatment and admission into hospital. Reading the reports in this light, all discrepancy between the results of St Bartholomew's Hospital, obtained from the use of quinine in relapsing fever, and that of the Edinburgh Hospital vanishes. Add fourteen to the day specified in the report as the day of the disease, and you will find nothing more on the twenty-eighth day, or the occasion of the second relapse, than was to be expected—viz., an increase of pulse, with slight increase of temperature, merely indicating the period at which the second relapse *ought* to have shown itself, and the good effects of quinine are reduced to *nil*. Every one who has had any experience of hospital patients, knows how extremely difficult it is to get them to fix the precise date of the beginning of their illness ; and in a complaint such as relapsing fever,

¹ British Medical Journal, February 26, 1870.

one is particularly apt to be deceived, unless very minute and searching questions are put to the patient; and even then the replies are far from satisfactory. This I believe to have been the case in those patients at St Bartholomew's, in whom the relapse was stated to have been successfully warded off.

IV. *Pathology.*

Only one death has resulted from relapsing fever, and this was in an old man of 59, and this implies a great age for a labouring man. The valves of the heart were atheromatous and thick at the apices, and slightly incompetent; but no murmur was detected during life. The heart's action was irregular and intermittent. In him nothing was found anatomically to account for death. Our only conclusion, then, as to the cause of death, was sudden syncope. He expressed himself half an hour before death as feeling very well, and the only note made at the visit concerning him was, that "the pulse was very intermittent, and the chest full of gurgling and wheezing." On section, the lungs were found congested and œdematous. But the most noticeable fact regarding any of the organs was the condition of the spleen. It weighed $13\frac{1}{2}$ ounces (nearly double the average weight of what is regarded as a healthy spleen), and was deeply congested; but it was not anything like so diffuent and pulpy as is usually the case in typhus fever. In fact, it was of firm consistence, and was stuffed with clots and coagula. The liver and kidneys were fatty, and the latter were also slightly amyloid. Such was all the information we gathered from the inspection of the various organs of the body after death from this peculiar disease; and it does not much help us to come to any conclusion as to the pathology of the disease.

I refrain from offering any theory as to its pathology, as I feel that I have no well-substantiated one to lay before you, and believing that any unsupported hypothesis would tend merely to weaken the value of the facts which I have attempted to put you in possession of.

And now I have done, and desire to thank you for the indulgence with which you have listened to my somewhat prolonged paper.

